Psychological Assessment
2003, Vol. 15, No. 2, 205–215

DOI: 10.1037/1040-3590.15.2.205

Multidimensional Personality Questionnaire Profiles of Veterans With Traumatic Combat Exposure: Externalizing and Internalizing Subtypes

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This study used the Multidimensional Personality Questionnaire (MPQ; A. Tellegen, in press) to identify personality-based subtypes of posttraumatic response. Cluster analyses of MPQs completed by combat veterans revealed subgroups that differed on measures relating to the externalization versus internalization of distress. The MPQ profile of the externalizing cluster was defined by low Constraint and Harmavoidance coupled with high Alienation and Aggression. Individuals in this cluster also had histories of delinquency and high rates of substance-related disorder. In comparison, the MPQ profile of the internalizing cluster was characterized by lower Positive Emotionality, Alienation, and Aggression and higher Constraint, and individuals in this cluster showed high rates of depressive disorder. These findings suggest that dispositions toward externalizing versus internalizing psychopathology may account for heterogeneity in the expression of posttraumatic responses, including patterns of comorbidity.

Research on the human response to psychological trauma has focused primarily on the diagnosis posttraumatic stress disorder (PTSD) and has tended to emphasize the universality of the syndrome by demonstrating commonalities in posttraumatic reactions across trauma populations (Weisaeth & Eitinger, 1993), developmental periods (Saigh, Yasik, Sack, & Koplewicz, 1999), and cultures (Marsella, Friedman, & Spain, 1996). The universality assumption (Herman, 1992; Marsella, Friedman, Gerrity, & Scurfield, 1996) has also been reflected in efforts to identify a central biological mechanism for the disorder (e.g., Pitman, 1993; Yehuda, 1997). Comparatively less attention has been paid to the considerable heterogeneity in expression of posttraumatic responses among individuals within a particular trauma population. Understanding this variability is important to advancing the understanding of the etiology and course of the disorder and to developing assessment and treatment techniques that appropriately address individual differences in clinical presentation.

Relevant to this issue is recent research suggesting that the behavioral dimensions of *externalization* (the propensity to express distress outward) and *internalization* (the propensity to express distress inward) reflect core personality processes that influence the form and expression of other forms of psychopathology. Factor analytic studies of the latent structure of mental illness suggest that patterns of comorbidity cohere along these dimensions with substance dependence and antisociality associated with the externalizing dimension, whereas the unipolar mood and anxiety disorders load on the internalizing dimension (Krueger, Caspi, Moffitt, & Silva, 1998; Krueger, McGue, & Iacono, 2001).

The objective of this study was to apply this model, developed to account for covariation among broad classes of psychopathology, to understand the heterogeneity of posttraumatic reactions. The central hypothesis was that the form and expression of posttraumatic responses are influenced by individual differences in tendencies toward externalization versus internalization of distress as evidenced by subtypes differing on these dimensions. To test this hypothesis, we performed cluster analyses on Multidimensional Personality Questionnaire (MPQ; Tellegen, in press) profiles obtained from a sample of veterans with traumatic combat exposure, and we examined the clinical and behavioral correlates of the resultant clusters.

The MPQ and the Three-Factor Model of Personality

The MPQ is a self-report inventory that assesses the emotional–temperamental structure of normal personality. It is composed of 11 primary trait scales that coalesce around three orthogonal higher order factors or broad traits: Positive Emotionality (PEM), Negative Emotionality (NEM), and Constraint (CON). PEM refers to individual differences in the capacity to experience positive emotions and tendencies toward active involvement in the social and work environments. It is similar in definition to constructs assessed by other omnibus personality inventories called Extraversion (e.g., Costa & McCrae, 1985; Eysenck & Eysenck, 1975), Activity (Buss & Plomin, 1975), and Ambition/Sociability (Hogan, 1986). NEM, in contrast, refers to dispositions toward negative moods and emotions and a tendency toward adversarial interactions with others. It is related closely to the personality constructs of neuroticism (Costa & McCrae, 1985; Eysenck &

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This research was supported in part by National Institute of Mental Health Grant MH63959 to Mark W. Miller. We are grateful to Danny G. Kaloupek and Christopher J. Patrick for their comments on earlier versions of this article.

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Eysenck, 1975), emotionality (Buss & Plomin, 1975), and adjustment (Hogan, 1986). The third higher order dimension, CON, consists of traits related to impulsivity versus behavioral restraint. It has been represented in other personality models as Psychoticism (Eysenck & Eysenck, 1975), Novelty Seeking (Cloninger, 1987), and Impulsivity (Buss & Plomin, 1975).

Evidence for the validity of these higher order personality factors and their relevance to psychopathology comes from various sources. There is considerable evidence that these constructs correspond closely to dimensions of temperament identified in studies on infancy and early childhood (Kagan, 1989; Kagan & Snidman, 1991; Rothbart, Derryberry, & Posner, 1994). Behavior genetics research has shown these dimensions to have substantial heritabilities (e.g., Robinson, Kagan, Reznick, & Corley, 1992; Tellegen et al., 1988), and scales measuring these dimensions show long-term stability in adulthood (Costa & McCrae, 1977, 1992; Watson & Walker, 1996). Recent studies suggest that high NEM combined with low PEM may reflect the personality substrate for the internalizing disorders (i.e., the unipolar mood and anxiety disorders; e.g., Achenbach & Edelbrock, 1978, 1984; Clark, Watson, & Mineka, 1994; Krueger et al., 2001), whereas low CON has been implicated in the etiology of the externalizing disorders (Kendler, Davis, & Kessler, 1997; Krueger et al., 2002; Sher & Trull, 1994; Widiger & Clark, 2000).

Previous Research on Subtypes of Posttraumatic Response

Only a handful of prior studies have examined the heterogeneity of posttraumatic reactions and possible subtypes of response to trauma. Hyer and colleagues (Hyer, Davis, Albrecht, Boudewyns, & Woods, 1994; Hyer, Woods, & Boudewyns, 1991) conducted three studies involving cluster analyses of Millon Clinical Multiaxial Inventory (MCMI; Millon, 1987) profiles of combat veterans with PTSD. All three studies produced evidence of antisocial−impulsive and anxious−avoidant−inhibited subtypes. Participants in the antisocial−impulsive clusters were characterized by elevated scores on the MCMI Antisociality, Hypomania, Narcissism, Paranoia, and Substance Abuse scales and high scores on the Hypomania scale of the Minnesota Multiphasic Personality Inventory (MMPI; Hathaway & Mckinley, 1983). In contrast, participants in the anxious−avoidant−inhibited clusters were characterized by elevated scores on the MCMI Schizoid, Avoidant, and Anxiety scales and by low scores on the Substance Abuse, Hypomania, Narcissism, and Antisociality scales. On the MMPI clinical scales, participants produced elevated scores on Depression, Psychasthenia, and Social Introversion. These findings provided preliminary evidence of subtypes of posttraumatic response that differ on characteristics related to the externalization (i.e., the antisocial−impulsive cluster) versus internalization (i.e., the anxious−avoidant−inhibited cluster) of posttraumatic distress.

Research Questions and Hypotheses

This study was designed to identify personality-based subtypes of posttraumatic response within a sample of veterans with combat exposure and to examine their clinical and behavioral correlates. Archival records including data from clinician-administered interviews, self-report personality and symptomatology instruments, and patient history were examined. Our aim was to assess whether the MPQ could be used to identify clinically meaningful subtypes within a heterogeneous sample of individuals with traumatic combat exposure. Following prior work by Hyer et al. (1991, 1994) and Krueger et al. (1998, 2001), we predicted that cluster analyses would partition the sample into subtypes reflecting individual differences in the propensity toward the externalization versus internalization of distress. Drawing on the conception that externalization involves impulsivity combined with a tendency to direct distress outward through antagonistic actions, we predicted the MPQ profiles of the externalizing subgroup would be characterized by low CON combined with high aggression. For this group, measures of psychiatric symptomatology were expected to reveal marked propensities toward substance abuse and antisociality. In contrast, the MPQ profiles of the internalizing subgroup were predicted to be characterized by low PEM combined with high NEM, and given the association between internalization and the unipolar depressive and anxiety disorders (Krueger et al., 1998, 2001), we also expected this subgroup to exhibit pronounced depressive and anxious symptomatology.

Method

Participants

Participants were 221 male combat veterans. All reported exposure to a combat-related traumatic experience meeting Criterion A for the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM–IV*; American Psychiatric Association, 1994) PTSD diagnosis as determined by a clinician, and all had scores greater than 0 on the Combat Exposure Scale (CES; Keane et al., 1989). The mean age of the sample was 53.0 years ($SD = 9.3$, range = 28−80), and the racial breakdown was as follows: 74% were White, 17% were Black, 4% were Hispanic, and 4% were other. Race data were missing for 1% of the participants. Sixty-one percent of participants were veterans of the Army, 20% were veterans of the Marines, 9% were veterans of the Air Force, 7% were veterans of the Navy, and 1% were veterans of another branch. Service branch data were missing for 2% of the participants. Veterans of the Vietnam War comprised 78% of the sample, veterans of the Persian Gulf War comprised 10%, veterans of World War II comprised 7%, veterans of the Korean War comprised 3%, and veterans of another era comprised 1%. Service era data were missing for 1% of the participants.

Measures

MPQ. The version of the MPQ used in this study was the Brief Form (MPQ-BF; Patrick, Curtin, & Tellegen, 2002), a 155-item form developed for use in research and screening settings. Like the full-length 276-item MPQ (Tellegen, in press), the MPQ-BF is composed of 11 primary trait scales: Wellbeing, Social Potency, Achievement, Social Closeness, Stress Reaction, Aggression, Alienation, Control, Harmavoidance, Traditionalism, and Absorption, along with three validity scales: Variable Response Inconsistency (VRIN), True Response Inconsistency (TRIN), and Unlikely Virtues. (See the Appendix for elaboration on characteristics associated with the primary trait scales.) The psychometric properties of the MPQ-BF are comparable to the full scale, and Pearson's product−moment correlations between the MPQ-BF and the full-length MPQ for primary trait scales range from .92 to .96. Evaluation of the internal consistency of each MPQ-BF primary trait scale in the current sample revealed the following Cronbach's alphas: Wellbeing = .90, Social Potency = .82, Achievement = .84, Social Closeness = .88, Stress Reaction = .89, Aggression = .85, Alienation = .87, Control = .79, Harmavoidance = .72, Traditionalism = .75, and Absorption = .74.

The MPQ-BF was scored using a computer program that outputs raw and standard scores for the primary, broad trait (PEM, NEM, and CON), and validity scales, and the MPQ-BF also determines the validity of profiles based on VRIN and TRIN cutoffs. The following three criteria are used to identify invalid test protocols: (a) the overall response pattern is excessively inconsistent with respect to item pair content (i.e., score on VRIN was 3.00 standard deviations above the normative mean VRIN score), (b) the response pattern is excessively polarized toward responding either true or false irrespective of item content (i.e., score on TRIN $>$ $\pm$3.21 standard deviations from the mean TRIN score), and (c) the response pattern is both inconsistent and polarized in direction (i.e., the score was 2.00 standard deviations above the mean for VRIN and $\pm$2.28 standard deviations from the mean for TRIN). One or more of the MPQ validity cutoffs were exceeded for 16 (7.2%) of the 221 MPQ profiles examined, which is comparable to the percentage of invalid profiles (8.7%) reported by Verona, Patrick, and Joiner (2001) in a sample of male prison inmates. These cases were excluded from all further analysis.

CES. The CES is a seven-item scale designed to assess the intensity, frequency, and duration of traditional combat experiences involving threat of danger, loss of life, or severe physical injury. Alpha was not calculated for this sample.

Clinician-Administered PTSD Scale (CAPS; Blake et al., 1995). The CAPS is a structured diagnostic interview designed to assess *DSM–IV* PTSD symptomatology. Clinicians rate the frequency and intensity of each PTSD symptom using behaviorally referenced scales ranging from 0 to 4. PTSD diagnoses were based on criteria specified in *DSM–IV*. Positive symptoms were endorsed with an intensity of one or greater and a frequency of two or greater within the last month. Weathers, Keane, and Davidson (2001) recently reviewed the existing research on the psychometric properties of the CAPS and found published interrater reliabilities for continuous CAPS scores to be .90 or higher, with diagnostic agreement in several studies reaching 100%. Similarly, test–retest reliabilities have been shown to be .90 or higher for the total severity score and diagnostic status. Alpha for the overall CAPS score in this sample (which was calculated using the sum of the frequency and intensity ratings for each of the 17 symptoms) was .92. Interrater reliability was not evaluated.

MMPI–2 (Butcher, Dahlstrom, Graham, Tellegen, & Kraemmer, 1989). The MMPI–2 was computer administered to 132 of the clinic patients who completed the MPQ. Following recommendations by Arbisi and Ben-Porath (1995) regarding MMPI–2 validity scale cutoffs for use with psychopathological populations, profiles with validity indices exceeding the following criteria were identified as invalid: $F > 100$ and $F(p) > 80$, or VRIN $>$ 80, or TRIN $>$ 100 (all *T* scores). Application of this rule resulted in the exclusion of 19 (14%) MMPI–2 profiles from all further analyses involving this measure.

Data analyses focused on the MMPI–2 clinical scales and the Personality Psychopathology Five Scales for the MMPI–2 (PSY-5; Harkness, McNulty, & Ben-Porath, 1995). The PSY-5 scales are (a) PEM/Extraversion, (b) NEM/Neuroticism, (c) CON, (d) Aggressiveness, and (e) Psychoticism, and they are based on a five-factor dimensional model of personality psychopathology. Three of the five scales correspond to the MPQ higher order factors and thus provide data directly relevant to the external validity of the MPQ-based clusters described below.

Premilitary delinquency scale. All clinic patients completed a 100-item background and demographics questionnaire that included 8 categorical or dichotomous items assessing delinquent behavior prior to joining the military: (1) "Were you ever suspended from school?" (2) "Were you ever expelled from school?" (3) "How often did you get into fights at school?" (4) "Did you ever feel you needed to have a weapon during school or in your neighborhood?" (5) "Were you ever on probation?" (6) "Were you ever incarcerated?" (7) "Did you ever get into trouble because of alcohol use?" and (8) "Did you ever use drugs?" Items were summed to produce a continuous measure reflecting the severity of premilitary delinquency (Item 3 was converted to a yes–no response format). Cronbach's alpha for the 8 items was .66. There were no items available to construct a similar index of premilitary internalizing behavior.

Global Assessment of Functioning (GAF; American Psychiatric Association, 1994). All clinic patients were assigned a GAF score reflecting their overall level of functioning at the end of the assessment. For 28 cases, the medical record included a second GAF score provided by a different clinician within 30 days of the score used for this study. The Pearson product−moment correlation (i.e., interrater reliability) for these two scores was .55.

Procedure

Two hundred twenty-one participants completed the MPQ, the CES, and the CAPS. Of these participants, 74 completed the measures during a single session of a research study conducted at a Veterans Affairs (VA) Medical Center in Boston, Massachusetts, and were recruited through flyers posted throughout the hospital. The remaining 147 participants were veterans assessed consecutively over a 2-year period in the PTSD clinic of the same facility. For these participants, data were collected in the context of a multisession comprehensive diagnostic evaluation aimed at assessing the presence of current combat-related PTSD. All CAPS interviews were conducted by doctoral-level clinical psychologists or by predoctoral clinical psychology interns. The MMPI–2, premilitary delinquency scale, and GAF ratings as well as other *DSM–IV* Axis I diagnoses assigned by the evaluating clinician were available for only 132 of the clinic patients. For these participants, the MPQ and the premilitary delinquency scale were completed at home, whereas the MMPI–2 and the CES were administered during a single session at the clinic. The mean interval of the date of completion between the take-home and the in-clinic instruments was 5 days.

Data Analysis

Cluster analyses. Cluster analysis is a multivariate statistical technique that identifies natural groupings of cases in a heterogeneous data set and organizes them into homogeneous subgroups on the basis of the degree of similarity among variables included in the analysis, which, in this case, were the 11 primary trait scales of the MPQ. A two-stage analysis was performed. In the first stage, Ward's method (Ward, 1963) with squared Euclidean distance as the distance measure was used to identify the optimal number of clusters in the data. Ward's method is a hierarchical, agglomerative cluster analysis technique that sorts cases into groups in a series of steps equal to the number of cases in the sample. On the first step of sorting, all cases are treated as individual clusters. At the final step, all cases are joined into one large group. Ward's method was selected because it is particularly adept at optimizing the minimum variance within clusters and because it provides a quantitative method for selecting the optimal number of clusters. By inspecting the change in error variance associated with each possible cluster solution, it is possible to identify the stage at which two relatively dissimilar clusters have been merged, indicating that the number of clusters prior to the merger is the optimal solution (Aldenderfer & Blashfield, 1984).

After establishing the optimal number of clusters for this sample, we performed a *K*-means analysis to assign individual cases to clusters. *K*-means is an iterative partitioning approach requiring a priori specification of the number of clusters. Its advantage relative to Ward's method is that it makes more than one pass through the data and can compensate for a poor initial partitioning (Aldenderfer & Blashfield, 1984). To ensure that differences in variability between scales would not influence resultant cluster patterns, we standardized each MPQ scale relative to the VA sample distribution for that scale. We used the VA sample norms, rather than the Minnesota community sample MPQ norms, because preliminary analyses showed marked differences between the two samples in the distribution of scores on several scales.

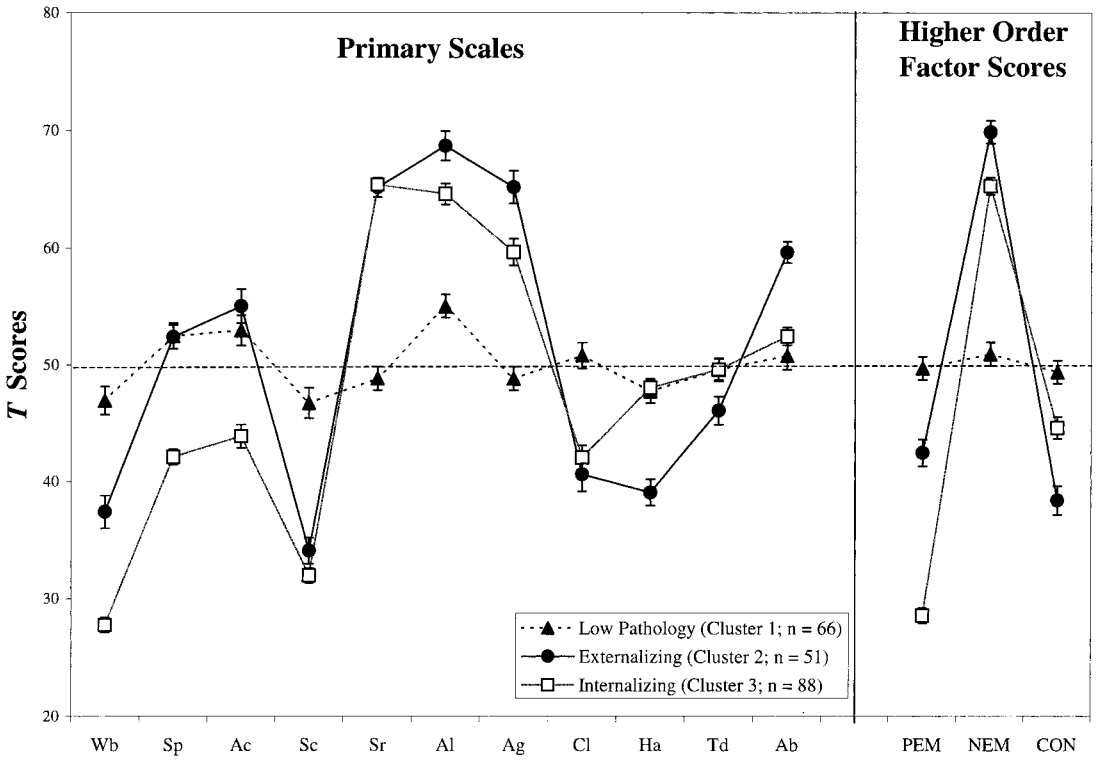

Figure 1. Multidimensional Personality Questionnaire primary and broad trait profiles by cluster. Error bars represent standard errors of the means. Wb = Wellbeing; Sp = Social Potency; Ac = Achievement; Sc = Social Closeness; Sr = Stress Reaction; Al = Alienation; Ag = Aggression; Cl = Control; Ha = Harmavoidance; Td = Traditionalism; Ab = Absorption; PEM = Positive Emotionality; NEM = Negative Emotionality; CON = Constraint.

Analyses examining differences between MPQ clusters. Differences between clusters were tested using parametric analyses of variance (ANOVAs) for continuous variables and nonparametric (Kruskal–Wallis) ANOVAs for categorical variables. To control for inflation of familywise error, we applied Bonferroni corrections to the alpha level set for each ANOVA on the basis of the number of comparisons within each set of variables, which is defined below. Post hoc comparisons were performed using Tukey's honestly significant difference (HSD; parametric) and Mann–Whitney (nonparametric) tests with alpha set at .05.

Results

Cluster Analyses: Three-Cluster Solution and Reliability (All Valid MPQs; n = *205)*

Inspection of the Ward's method agglomeration schedule revealed a marked increase in error variance at the 203rd step of the analysis relative to previous steps, implying that the number of clusters prior to the merger (three) was the most probable solution. A three-cluster *K*-means analysis resulted in the assignment of 66 cases to Cluster 1 (low pathology), 51 cases to Cluster 2 (externalizing), and 88 cases to Cluster 3 (internalizing). Figure 1 depicts the mean score on the MPQ primary and broad trait scales by cluster.[1]

To examine the reliability of this solution, we divided the sample in half by using randomly assigned odd or even participant numbers, and the analysis was replicated on the two halves separately. The Ward's method analysis indicated that a three-cluster solution best fit the data for both halves of the data set, and the *K*-means analysis produced a highly similar pattern of results across the two halves. To quantify the degree of similarity between sample halves, we computed the difference between sample halves for each scale by cluster. The differences between sample halves in mean standardized scale scores averaged across the 11 primary MPQ scales for Clusters 1, 2, and 3 were 3.66 (*SD* = 3.47), 0.86 (*SD* = 1.57), and 1.84 (*SD* = 3.62), respectively. Additional evidence of the internal consistency of this cluster solution was provided by results of a two-way Sample Half × Cluster Group multivariate analysis of variance performed on all 11 primary MPQ scales, which showed significant Sample Half × Cluster Group interactions for only 2 of the 11 primary trait scales (Wellbeing and Absorption). Post hoc tests showed that these effects were due to the finding that for Wellbeing there was a 9-point difference between sample halves for Cluster 1, and for Absorption there was an 8-point difference between sample halves for Cluster 3.

[1] Although cluster analyses were based on standard scores from the VA sample, results are presented in *T* scores based on the community sample on which the full-length MPQ was normed. These scores represent the normal population distribution and provide a more informative referent for scale score interpretation.

Cluster analyses performed on only the cases with a diagnosis of PTSD ($n = 159$) also indicated that a three-cluster solution best fit the data. The PTSD-only clusters were highly similar to those described for the full sample as evidenced by the finding that the correlation between the full sample and the PTSD-only subsample for cluster membership was .91.

MPQ Profile Differences Between Clusters (All Valid MPQs; n = *205)*

Low pathology versus the externalizing and internalizing clusters. Table 1 lists the means and standard deviations for each scale by cluster along with significant one-way ANOVA *F* ratios and pairwise comparisons. Cluster 1 (low pathology) was characterized by statistically average scores on all MPQ scales with *T* scores falling between 46 and 53. In contrast, Clusters 2 (externalizing) and 3 (internalizing) deviated dramatically from Cluster 1 in pathological directions on most of the MPQ scales. One-way ANOVAs, with alpha set to .05/14 (i.e., the number of measures in this family of analyses) = .003, revealed significant differences between clusters on all three of the broad trait scales and on 10 of the 11 primary trait scales, the exception being Traditionalism. Post hoc tests (Tukey's HSD with α set to .05) following significant ANOVAs showed that compared with individuals in the low-pathology cluster, those in the externalizing and internalizing clusters produced significantly lower scores on the broad trait scale PEM and on two of its constituent scales, Wellbeing and Social Closeness. On the other two PEM scales, Social Potency and Achievement, the internalizing cluster had lower scores than the other two clusters. The externalizing and internalizing clusters were also significantly higher on NEM (including all three of its constituent scales: Stress Reaction, Alienation, and Aggression) and lower on CON and Control than the low-pathology cluster. The externalizing cluster also produced significantly lower scores on Harmavoidance than the other two clusters. Finally, on the Absorption scale, which does not load substantially on any of the higher order MPQ factors, analyses showed that those in the externalizing cluster scored significantly higher than either of the other two clusters.

Externalizing versus internalizing clusters. Significant group differences were also observed between the two high-pathology clusters, with those in the externalizing cluster producing higher scores on PEM and NEM and lower scores on CON than those in the internalizing cluster. On the primary trait scales, participants in the externalizing cluster showed higher scores on Wellbeing, Social Potency, Achievement, Alienation, Aggression, and Absorption but lower scores on Harmavoidance. There were no significant differences between those in the internalizing cluster and those in the externalizing cluster on Social Closeness, Stress Reaction, or Control.

Comparison of the Clusters on Measures of Combat Exposure and PTSD

The means and standard deviations for measures of combat exposure and PTSD along with significant one-way ANOVA *F* statistics and pairwise comparisons are listed in Table 2. There were no significant group differences in combat exposure as indexed by the CES; however, the percent-

Table 1
Multidimensional Personality Questionnaire Brief Form Higher Order Factor and Primary Trait Scale Scores by Cluster Group

	Cluster							
	Low pathology (Cluster 1)[a]		Externalizing (Cluster 2)[b]		Internalizing (Cluster 3)[c]			
Measure	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*(2, 202)	Pairwise contrast
Higher order factor								
PEM	49.7	11.0	42.5	8.2	28.6	5.9	126.3	1 > 2 > 3
NEM	50.9	8.2	69.9	6.8	65.3	6.8	114.4	2 > 3 > 1
CON	49.4	8.8	38.4	8.8	44.6	8.7	22.9	1 > 3 > 2
Primary trait								
Wellbeing	47.0	9.7	37.4	10.0	27.8	5.8	100.9	1 > 2 > 3
Social Potency	52.5	9.1	52.4	7.3	42.1	6.2	47.6	1 & 2 > 3
Achievement	53.0	10.9	55.0	10.4	43.9	9.5	24.6	1 & 2 > 3
Social Closeness	46.7	10.4	34.1	7.9	32.0	5.9	68.0	3 > 1 & 2
Stress Reaction	48.8	8.7	65.2	6.0	65.4	5.5	130.0	2 & 3 > 1
Alienation	55.0	7.9	68.7	8.8	64.6	8.4	43.1	2 > 3 > 1
Aggression	48.8	7.7	65.2	9.9	59.7	10.6	45.8	2 > 3 > 1
Control	50.8	8.9	40.6	10.3	42.1	10.0	20.7	1 > 2 & 3
Harmavoidance	47.7	7.9	39.1	8.1	48.1	7.1	25.9	1 & 3 > 2
Traditionalism	49.6	8.7	46.1	8.6	47.6	8.5	*ns*	*ns*
Absorption	50.8	9.7	59.6	6.4	52.5	7.0	20.3	2 > 1 & 3

Note. All *F* ratios listed are significant at $p < .003$. Total sample size for all analyses was 205. PEM = Positive Emotionality; NEM = Negative Emotionality; CON = Constraint.
[a] $n = 66$. [b] $n = 51$. [c] $n = 88$.

Table 2
Group Differences on Measures of Trauma Exposure, Posttraumatic Stress Disorder (PTSD) and Other Psychopathology, Premilitary Delinquency, and Current Functioning

	Cluster								
	Low pathology (Cluster 1)		Externalizing (Cluster 2)		Internalizing (Cluster 3)				
Variable	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*	$\chi^2(2)$	Pairwise contrast
Measure									
CES	22.9	9.2	22.8	9.4	23.0	10.0	*ns*		*ns*
CAPS total score	46.4	29.7	75.4	21.9	74.8	23.8	28.4**[a]		2 & 3 > 1
Delinquency	0.9	1.2	1.8	1.3	0.8	1.5	4.6*[b]		2 > 1 & 3
GAF	54.7	10.7	46.6	7.4	47.4	7.6	8.7**[b]		1 > 2 & 3
Diagnosis (%)									
PTSD	51.5		90.2		89.8			37.8**[c]	2 & 3 > 1
Depressive disorder	32.1		31.0		58.7			8.1**[d]	3 > 1 & 2
Other anxiety disorder	7.1		6.9		12.7			*ns*	*ns*
Substance abuse disorder	53.5		72.4		47.6			*ns*	2 > 3

Note. Combat Exposure Scale (CES) scores, percentage of participants with PTSD, and Clinician-Administered PTSD Scale (CAPS) total scores were available for all cases with a valid Multidimensional Personality Questionnaire Brief Form score ($n = 66$ for Cluster 1, $n = 51$ for Cluster 2, $n = 88$ for Cluster 3). All other measures were available for the clinical subsample only ($n = 28$ for Cluster 1, $n = 29$ for Cluster 2, $n = 63$ for Cluster 3). Range of possible scores was 0–41 for CES, 0–136 for CAPS, 0–8 for premilitary delinquency scale (Delinquency), and 0–100 for Global Assessment of Functioning (GAF).
[a] *df*s = 2, 202. [b] *df*s = 2, 117. [c] $N = 205$. [d] $N = 120$.
* $p < .05$. ** $p < .001$.

age of individuals with a diagnosis of PTSD was greater in the externalizing and internalizing clusters than in the low-pathology cluster, with no significant difference between the externalizing and the internalizing clusters. The same pattern was observed when CAPS total scores were examined.[2]

Comparison of the Clusters on the MMPI–2 Clinical and PSY-5 Scales (Clinic Subsample With Valid MPQ and MMPI–2 Profiles Only; n = *102)*

Low pathology versus the externalizing and internalizing clusters. Table 3 lists the means, standard deviations, and statistical test results for the MMPI–2 clinical and PSY-5 scales. On the clinical scales, individuals in the high-pathology clusters scored significantly higher than those in the low-pathology cluster on Depression, Psychopathic Deviate, Paranoia, Psychasthenia, and Schizophrenia scales. For the PSY-5 scales, analyses showed that individuals in the low-pathology cluster scored significantly lower on NEM and Psychoticism and higher on PEM than those in the other two clusters.[3]

Externalizing versus internalizing clusters. Tukey's HSD tests following significant ANOVAs revealed that those in the internalizing cluster scored significantly higher on Depression and Social Introversion and lower on the PSY-5 PEM scale than those in the externalizing cluster. In contrast, those in the externalizing cluster showed higher scores on Hypomania and the PSY-5 Aggression scale and lower scores on CON compared with those in the internalizing cluster.

Comparison of the Clusters on Premilitary Delinquency, GAF, and Other Axis I Diagnoses (Clinic Subsample With Valid MPQs Only; n = *120)*

Table 2 lists the means, standard deviations, and statistical test results for the premilitary delinquency scale, GAF ratings, and proportion of individuals assigned diagnoses of major depression or dysthymia, other anxiety disorders, and/or substance abuse disorders. On the premilitary delinquency scale, the externalizing cluster produced significantly higher scores than the internalizing and low-pathology clusters. In line with the foregoing evidence of greater psychopathology in the externalizing and internalizing clusters than in the low-pathology cluster, analyses showed that individuals in the low-pathology cluster received significantly higher GAF ratings than those in the other two clusters. Significant group differences were also observed in the frequency of depressive disorders, with those in the internalizing cluster showing higher rates of these diagnoses than those in either the low-pathology or the externalizing cluster. In addition, although the overall ANOVA testing group differences in rates of substance abuse disorder diagnosis was nonsignificant, $\chi^2(2, N = 120) = 4.12$, $p = .12$, a test of the a priori hypothesis that the

[2] Likewise, there were no differences between groups in the severity of individual clusters of PTSD symptoms (i.e., reexperiencing, avoidance and numbing, and hyperarousal). In addition, there were no significant differences between clusters in age, race, service branch, or service era.

[3] Bivariate correlations between the MPQ broad trait scales and the corresponding PSY-5 scales were as follows: PEM = .67, NEM = .54, and CON = .49 ($n = 102$).

Table 3
MMPI–2 Clinical Scales and PSY-5 Factor Scores by Cluster Group

	Cluster							
	Low pathology (Cluster 1)[a]		Externalizing (Cluster 2)[b]		Internalizing (Cluster 3)[c]			
Measure	*M*	*SD*	*M*	*SD*	*M*	*SD*	*F*(2, 99)	Pairwise contrast
Clinical scales (*T* scores)								
Hypochondriasis	69.5	12.4	74.7	13.8	76.9	13.6	*ns*	*ns*
Depression	68.2	13.1	77.4	13.4	85.8	9.8	21.1	3 > 2 > 1
Hysteria	65.3	15.1	70.7	14.6	74.3	17.0	*ns*	*ns*
Psychopathic Deviate	58.4	13.1	72.4	10.9	69.8	10.7	11.7	2 & 3 > 1
Masculinity/Femininity	46.7	7.6	49.4	9.6	51.9	8.0	*ns*	*ns*
Paranoia	59.5	17.5	75.6	14.9	74.8	18.0	8.1	2 & 3 > 1
Psychasthenia	64.1	11.4	76.1	15.4	83.0	13.4	17.8	2 & 3 > 1
Schizophrenia	66.5	14.0	87.7	16.1	83.8	17.0	13.5	2 & 3 > 1
Hypomania	52.0	9.4	64.1	9.7	52.4	8.2	15.5	2 > 1 & 3
Social Introversion	59.7	10.0	66.1	12.5	73.4	9.8	15.8	3 > 1 & 2
PSY-5 scales (raw scores)								
PEM/Extraversion	18.22	5.7	13.86	6.3	10.11	4.6	21.0	1 > 2 > 3
NEM/Neuroticism	13.11	1.2	19.54	5.9	21.81	5.0	22.3	2 & 3 > 1
CON	15.85	4.1	12.86	3.5	16.77	4.0	7.7	1 & 3 > 2
Aggressiveness	9.33	2.1	12.14	3.1	8.72	2.7	13.3	2 > 1 & 3
Psychoticism	5.63	3.7	10.18	4.6	8.47	4.4	7.2	2 & 3 > 1

Note. All *F* ratios listed are significant at $p < .003$. Participants with invalid MMPI–2 scores were excluded from these analyses. Range of possible scores was 0–34 for Positive Emotionality (PEM), 0–33 for Negative Emotionality (NEM), 0–29 for Constraint (CON), 0–18 for Aggressiveness, and 0–25 for Psychoticism. MMPI–2 = Minnesota Multiphasic Personality Inventory—2; Psy-5 = Personality Psychopathology Five.
[a] $n = 27$. [b] $n = 22$. [c] $n = 53$.

externalizing and internalizing clusters would differ on this measure was significant, that is, externalizing versus internalizing cluster simple effect test: $Z(92) = 2.03$, $p < .05$ (one-tailed). There were no significant group differences in prevalence of other anxiety disorders.

Discussion

The purpose of this study was to examine the utility of the MPQ for identifying subtypes of posttraumatic response based on personality dimensions believed to underlie externalizing and internalizing psychopathology (Krueger et al., 1998, 2001). Cluster analyses performed on the MPQ profiles of male veterans with traumatic combat exposure revealed a low-pathology cluster characterized by MPQ scale scores falling at or near the standardization sample mean and two more pathological clusters characterized by extreme deviations from the normative mean on several scales. The latter were characterized by high rates of PTSD, by elevations on an array of psychopathology scales on the MMPI–2, and by MPQ profiles characterized by low scores on measures of PEM and CON with markedly elevated scores on measures of NEM.[4] All three groups endorsed comparable levels of combat exposure.

Cluster analyses partitioned cases with pathological MPQ profiles into subgroups that differed on personality dimensions associated with externalizing and internalizing psychopathology, and evidence for the validity of this classification was provided by independent, clinically relevant indicators. On the MPQ, the externalizing cluster was defined by low scores on the broad trait scale CON (especially Harmavoidance) and high scores on Alienation and Aggression relative to the other two clusters. Individuals in this cluster also produced higher scores than those in the other two clusters on the MMPI–2 Hypomania and PSY-5 Aggressiveness scales and lower scores on the PSY-5 CON scale and were more likely than those in the internalizing cluster to have a substance abuse disorder diagnosis. Thus, the portrait that emerges from this subtype is a veteran who is more emotionally labile, overactive, impulsive, fearless, aggressive, intimidating, likely to feel chronically betrayed and mistreated by others, and likely to abuse substances compared with members of the other two clusters. Individuals in this subgroup also reported higher rates of premilitary delinquency than those in the other two clusters, suggesting that these characteristics may reflect the influence of

[4] These findings suggest that certain MPQ scales are sensitive to psychopathological processes and may be useful for discriminating individuals with and without PTSD—an observation offered previously by Kuhne, Orr, and Baraga (1993). Examination of MPQ profile differences between individuals with a diagnosis of current PTSD ($n = 159$, or 78% of total sample) and those without the disorder ($n = 46$, or 22%) revealed significant group differences on several subscales. Bonferroni-corrected two-tailed *T* tests showed that compared with veterans with no PTSD diagnosis, veterans with PTSD scored significantly lower on PEM and two of its constituent scales (Wellbeing and Social Closeness), higher on NEM and all three associated primary trait scales (Stress Reaction, Alienation, and Aggression), lower on CON and Control, and higher on Absorption. There were no significant group differences on Social Potency, Achievement, Harmavoidance, or Traditionalism.

personality traits that were present prior to the traumatic combat exposure.

The profile of the veteran in the second, more pathological cluster contrasted starkly with that of his externalizing counterpart, suggesting an internalizing form of posttraumatic adjustment. Individuals in this cluster were characterized by extremely low scores on the PEM scales of the MPQ, and although the mean Stress Reaction score for this group was equivalent to that of the individuals in the externalizing cluster, the Alienation and Aggression scores of those in the internalizing cluster were significantly lower and their CON scores significantly higher. Compared with the other two clusters, those in the internalizing cluster were also characterized by greater elevations of the Depression and Introversion clinical scales of the MMPI–2, by low scores on the PSY-5 PEM scale, and by a higher likelihood of being diagnosed with a unipolar depressive disorder.

In sum, these findings suggest that although those in the internalizing and externalizing clusters endorsed comparable levels of posttraumatic distress (as indexed by CAPS total score, by proportion of cases meeting the *DSM–IV* criteria for PTSD, by the majority of the MMPI–2 clinical scales, and by the MPQ Stress Reaction scales), those in the externalizing cluster tended to express this distress outwardly through antagonistic interactions with others and society, whereas those in the internalizing cluster tended to experience this distress in the form of depression and social avoidance. These clusters are similar to the antisocial and anxious–depressed clusters identified by Hyer et al. (1991, 1994) and are consistent with a wider body of research suggesting that externalizing psychopathology is associated with impulsivity and elevated activity levels, whereas the internalizing disorders are associated with anxiety and depression (Caspi, Henry, McGee, Moffitt, & Silva, 1995; Merikangas, Swendsen, Preisig, & Chazan, 1998).

One caveat regarding the use of the labels *externalizing* and *internalizing* for the two pathological clusters is that the MPQ profiles associated with these subgroups differed somewhat from the constructs delineated by Krueger et al. (2001). Specifically, Krueger et al.'s model implies that those in the internalizing cluster should be defined by high rates of both depression and anxiety. The findings of the present study provide only partial support for this hypothesis, indicating that although the participants in the internalizing cluster were characterized by distinctly depressive profiles across multiple measures, these participants did not exhibit significantly greater levels of pathological anxiety (e.g., higher scores on the MPQ Stress Reaction and MMPI–2 Psychasthenia scales) than those in the externalizing cluster. One possible explanation for the absence of such differentiation that should be addressed in future research is that heightened anxiety may be a universal, or syndromal, feature of the pathological response to trauma and therefore represents a dimension along which internalizing and externalizing pathological subtypes are unlikely to differ.

Krueger et al.'s (2001) model also implies that those in the externalizing cluster should have lower scores on all of the MPQ CON scales and higher scores on MMPI–2 scales measuring antisociality and impulsivity (e.g., Psychopathic Deviate and Hypomania) compared with those in the internalizing cluster. However, the findings of this study provide only partial support for this hypothesis. Specifically, although those in the externalizing cluster did score significantly lower on the MPQ broad trait scale CON, lower on the MPQ primary trait scale Harmavoidance, and higher on the MMPI–2 Hypomania scale than those in the internalizing cluster, these groups did not differ significantly on the MPQ Control or Traditionalism scales or on the MMPI–2 Psychopathic Deviate scale. This somewhat mixed result may, in part, reflect the fact that both pathological groups scored significantly lower on Control and higher on Psychopathic Deviate than the low-pathology cluster, a finding that echoes previous observations that heightened impulsivity is a common characteristic of combat veterans with PTSD and, like heightened anxiety, may be syndromal in this population (Richman & Frueh, 1997; Wang, Mason, Charney, & Yehuda, 1997). It is important to note that those in the externalizing and internalizing clusters did differ in predicted directions on Aggression and Alienation. Thus, although the clusters observed in this study may not represent externalizing and internalizing prototypes as defined by Krueger et al., the overall psychometric profile is highly consistent with these constructs.

On another note, results showed that the correspondence between a diagnosis of PTSD and membership in a pathological MPQ cluster was not perfect. Approximately half of the participants in the low-pathology cluster met criteria for PTSD, whereas roughly 10% of those in the internalizing and externalizing clusters did not. The former result suggests that not all veterans with a diagnosis of combat-related PTSD exhibit significant pathology on personality measures, whereas the latter indicates that there may be substantial proportions of veterans with traumatic combat exposure who exhibit clinically significant levels of personality pathology but do not meet *DSM–IV* criteria for PTSD.

There are several noteworthy limitations to this study. First, the use of a cross-sectional research design is a limiting factor for any research on the relationship between personality and PTSD because it is impossible to disentangle personality traits from characteristics of the PTSD syndrome. The pathological subtypes identified in this study may reflect (a) enduring personality dispositions that existed prior to the trauma, (b) permanent alterations in personality structure that occurred as a consequence of trauma exposure, (c) correlates of transient psychopathological states, or (d) any combination thereof. Despite evidence for the longitudinal stability of personality traits (e.g., Costa & McCrae, 1977, 1992; Watson & Walker, 1996), scales measuring these constructs are susceptible to contamination by the state of mental health at the time of measurement (Bianchi & Fergusson, 1977; Duncan-Jones, Fergusson, Ormel, & Horwood, 1990; Kerr, Schapira, Roth, & Garside, 1970). Also, patients with anxiety and depressive disorders have been found to respond differently to personality inventories administered during the experience of the disorder compared with after the remission of symptoms (Hirschfeld et al., 1983; Reich, Noyes, Coryell, & O'Gorman, 1986). We tried to assess premorbid externalizing characteristics by examining self-reports of delinquency prior to military enlistment and found evidence that those in the externalizing cluster reported more problem behaviors of this sort. However, although these data are suggestive of stability in externalizing behavior across the life span, they too can be criticized on the basis of the fallibility of retrospective reports (Harvey & Bryant, 2000; Rogler, Malgady, & Tryon, 1992). As a result, etiological inferences about the extent to which the MPQ-based subtypes identified here reflect the influence of premorbid personality are limited.

Second, the extent to which these findings generalize to other trauma populations is another limitation of this study. The fact that the sample was composed entirely of male veterans, the majority of whom were in treatment or were compensation seeking, raises questions as to whether a similar cluster solution would result from analyses of MPQs obtained from other samples of veterans or from altogether different populations, such as female sexual abuse survivors. Evidence from the child and adult psychopathology literatures suggests that sex differences likely play a role in the development of internalizing versus externalizing disorders, with men being more likely to develop the latter (Kessler et al., 1997; Kessler, McGonagle, Swartz, Blazer, & Nelson, 1993; Rende & Plomin, 1992). Recent research also suggests that whereas combat veterans are more likely to exhibit externalizing symptoms, sexual assault survivors may be more likely to evidence internalizing symptoms (Kirz, Drescher, Klein, Gusman, & Schwartz, 2001). Thus, one might expect to find less externalizing in female samples, mixed gender samples, or trauma samples of a different nature, possibly resulting in different cluster solutions altogether. It will be important for future studies to examine whether similar subtypes are present in other samples of trauma-exposed individuals.

Finally, there are also several study limitations related to the fact that the data for this study were drawn primarily from archival clinical records. First, the MMPI–2, premilitary delinquency scale, GAF, and other *DSM–IV* Axis I diagnoses were available for only a subset of the overall sample. Second, interrater reliability was not systematically assessed for any of the clinician-determined measures, and Axis I diagnoses other than PTSD were not derived from structured clinical interviews. Third, for clinic participants, the MPQ and the premilitary delinquency scale were completed at home with an average duration of 5 days between administration of these measures and the other measures. Fourth, the premilitary delinquency scale was developed for this study from existing items in a background and demographics questionnaire. These are the first data on its reliability and validity, alpha was marginal, and there was no comparable measure of premilitary internalizing problems.

In light of these limitations, the results of this study suggesting the presence of subtypes linked to individual differences in the propensity toward internalizing versus externalizing psychopathological behaviors should perhaps be considered a first step toward the development of a model that accounts for the considerable heterogeneity in responses to trauma. Future work should focus on (a) replicating and validating these clusters using other samples and other independent, clinically relevant indicators; (b) examining the degree to which these subtypes relate to the course of posttraumatic adjustment and differential responses to treatment; and (c) evaluating the extent to which these subtypes reflect premorbid personality traits believed to underlie externalizing and internalizing psychopathology. It would also be useful in such research to collect a broad range of *DSM–IV* symptom data and to cluster individuals according to patterns of comorbidity. Evidence of PTSD subtypes characterized, on the one hand, by comorbid anxiety disorders and/or unipolar mood disorders and, on the other hand, by comorbid antisociality and substance abuse would provide important supporting evidence for this model and advance the understanding of the mechanisms underlying patterns of psychiatric comorbidity and individual differences in the response to traumatic stress.

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Appendix

Characteristics Associated With Multidimensional Personality Questionnaire (MPQ) Primary Trait Scales

MPQ scale	Self-description of high scorers
Positive Emotionality	
Wellbeing	Is generally happy, optimistic, and hopeful; lives an exciting, active life full of interesting experiences.
Social Potency	Is interpersonally dominant, persuasive, and influential; enjoys visibility and being in charge.
Achievement	Is ambitious, likes working long hours, enjoys challenging tasks and is persistent.
Social Closeness	Likes people and is sociable, values close relationships, is warm and affectionate, welcomes support from others.
Negative Emotionality	
Stress Reaction	Is nervous, tense, and easily upset; feels vulnerable and sensitive; has changing moods; is prone to worry. Experiences negative emotional states such as anger, distress, and guilt at a high frequency and intensity even under everyday life conditions.
Alienation	Feels betrayed, deceived, exploited, and mistreated. Perceives the social world as malevolent and believes that others want him to fail.
Aggression	Enjoys causing others distress and observing violence. Will victimize for his own benefit; is physically aggressive, vengeful, and vindictive.
Constraint	
Control	Is cautious, reflective, sensible, and organized. Tries to anticipate events and plan ahead.
Harmavoidance	Is careful to avoid risk of injury; avoids disaster areas and dangerous emergencies. Dislikes thrilling but risky adventures.
Traditionalism	Advocates high moral standards, endorses religious values and institutions, condemns selfishness, believes in strict child-rearing practices and opposes permissiveness.
Absorption	Can imagine vividly, easily relives the past, becomes engrossed in his own thoughts, and has episodes of expanded or altered awareness. Is responsive to evocative and involving stimuli.

Received October 31, 2001
Revision received December 3, 2002
Accepted January 7, 2003 ■